



4.8 EROSION

OBJECTIVES

The students

- Identify and observe examples of erosion in their environment.
- Construct models of erosion caused by wind, rain-runoff and waves.
- Identify the connections between flooding and erosion.
- Connect the study of erosion to their Pacific Island environment.

CLIMATE EDUCATION FRAMEWORK

- 3-5Impacts.A.1 Erosion is the movement of Earth materials (such as coastal land) by forces such as moving water (waves, currents, floods) and wind. Erosion and floods threaten homes, roads, and other coastal development.
- 3-5Impacts.A.2 Global climate change is causing sea levels to rise. Higher sea levels cause more erosion of coastal areas such as beaches. Higher sea levels also cause more damage from flooding events such as very high tides, storm surges, and very heavy rainfall.
- 3-5Adapt.A.1 Human activities such as agriculture, fishing and transportation can have major effects on the land, vegetation, animals, water, ocean, and air.

BACKGROUND

The students begin their study of the impacts of climate change with an investigation of one of the more observable impacts, erosion. There are multiple causes of erosion including weather events and human activities. The primary goals for this activity are for the students to understand what erosion is and to begin to identify some of the natural forces that cause it. In the next activity the students consider human activities that cause or increase erosion and ways to prevent or limit erosion. Students begin by looking for examples of erosion in their local environment. A walk around the school campus after a moderate to heavy rainfall can provide a good starting point.

The simulations in this activity are usually best done outside! Encourage student creativity and imagination. Following are some teacher hints and suggestions. Fans and invented water sprinklers make wind and rain. A bucket of water can simulate strong wave action. Flooding calls for lots of rain-making and usually an incline. Soil and sand should be fairly dry, keeping in mind that wind also has a role in wave erosion.

- For wave erosion, the soil should border on a body of water—this will take some invention. A fan can be used to generate waves or students can invent some other wave-making device.
- Water erosion takes several forms, including waves. The rain model should probably be placed on an angle to help simulate runoff. A watering can or a container with holes punched in the bottom can serve as a rainmaker.

- A small channel cut through the soil can represent a stream. Place the model on an angle. A lake or pond can be placed at the upper end. As water drains down the stream or river, soil will erode from along the banks eventually widening the river or stream.

Appendix F GRAVITY provides an activity to help students better understand this concept and its role in the erosion process.

This activity should be immediately followed by 4.9 IMPACTS OF CLIMATE CHANGE as the students reuse the models they construct in this investigation.

MATERIALS

Cardboard boxes: the type that hold 4 six-packs, lids from photocopy paper or similar—
1 per group

Plastic bags large enough to cover boxes—1 per group

Soil

Sand

Electric fan and extension cord

Water

Containers for rain-makers such as large cans or plastic containers

Other supplies as requested by groups

Appendix F GRAVITY

Working Dictionary

STUDENT ROLES

Meteorologist

Geologist

PRODUCTS

Simulations of the erosion process

Working definition of erosion

PROCEDURES

1. Briefly discuss the concept of erosion with the class. Then have them observe and identify examples of erosion in the local environment.

Ask such questions as

- Does anyone know what the word *erosion* means?
 - ✓ If not, have them look the word up in a dictionary, on the Internet, or in another resource.
- Have you ever seen an example of erosion occurring? Where?
- What do you think causes erosion?
 - ✓ Accept all ideas at this point.
- Where else do you think erosion might occur in our island environment?
- Do you think you could identify more examples of erosion.
 - ✓ Have the students look for additional examples and report on what they find for homework.

2. Discuss their findings the following day.

Ask such questions as

- Where did you find examples of erosion?
- What natural forces do you think caused the erosion?
 - ✓ Work to include examples of wind erosion, wave erosion, and water erosion from rain or runoff.

If human activities are mentioned, acknowledge that these too can cause or increase erosion and that these will be investigated in 4.9 IMPACTS OF CLIMATE CHANGE.

- 3. Introduce the idea of designing and constructing models to simulate wind erosion, wave erosion, and water erosion from rain or runoff.**
- 4. Have the students work in small groups to design a model of erosion. Show them a sample of a plastic covered box filled with soil or sand to simulate the surface of the Earth. Be sure to include models of local examples.**
- 5. Have the student groups construct their models. Encourage them to include buildings, vehicles, bridges and so forth.**
- 6. Have each group present and run their simulation for the class. Have the group describe how their model simulated the actual erosion process. Have them save their models for the next activity.**
- 7. Discuss the effects of erosion on the Earth's surface. Help students to describe the role of gravity in the erosion processes.**
Ask such questions as
- What effect does erosion seem to have on the surface of our island?
 - What natural forces seem to cause erosion to occur?
 - ✓ Include such ideas as wind and water including rain, run off, and wave action.
 - How do you think gravity affects erosion?
 - ✓ If students are not familiar with this concept, consider using the activities in Appendix F GRAVITY.
- 8. Help the students relate and connect their understanding of erosion to the formation of their Pacific Island. See Activity 3.9 From Islands to Atolls.**
- 9. Have the students save their models for use in the next activity 4.9 IMPACTS OF CLIMATE CHANGE.**
- 10. Have the students write a working definition for erosion. Put it in the Working Dictionary.**